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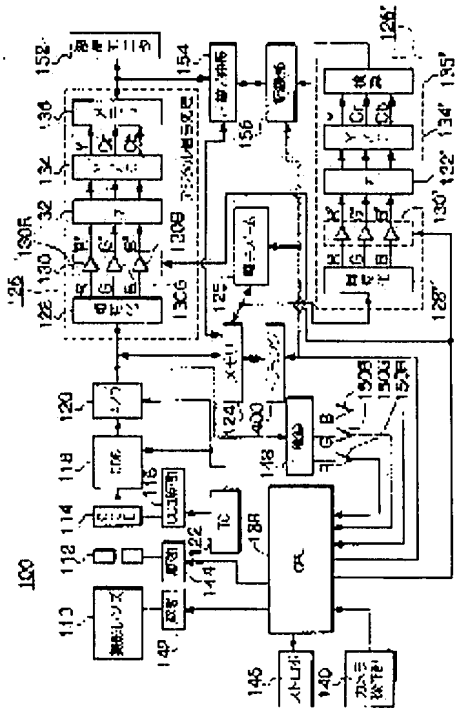
(54) DIGITAL CAMERA AND PRINTER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a digital camera and printer that can record information usable for white balance adjustment and/or information usable for scene discrimination, which is obtained from an image in a wider area than that of an image subjected to electronic zooming or the like, onto a recording medium as attached information of the image subjected to electronic zooming or the like and can use the attached information to print out the image subjected to electronic zooming or the like.

SOLUTION: An electronic zoom section 125 segments the image in the zoom area from the image of an entire imaging area of a CCD 114 stored in a memory 124, and a recording section 156 records the segmented image onto a recording medium through a digital signal processing circuit 126. On the other hand, the image of the entire imaging area of the CCD 114 is read from the memory 124, the information usable for white balance adjustment and/or the information usable for scene discrimination is generated from the read image through a digital signal processing circuit 126', and the recording section



156 records the generated information onto the recording medium as the attached information of the image.

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CLAIMS

[Claim(s)]
[Claim 1] In the digital camera which records the image which picturizes a photographic subject using an image sensor and is acquired by this image pick-up on a record medium The 1st image acquisition means which acquires the 1st image for recording on said record medium from the 2nd image pick-up area smaller than the 1st image pick-up area of the whole image pick-up side of said image sensor, The 2nd image acquisition means which acquires the 2nd image from image pick-up area larger than said 2nd image pick-up area, With an information generation means to generate available information to white balance adjustment of said 1st image based on said 2nd image, and said 1st image The digital camera characterized by having a record means to relate with this 1st image and to record information available to said white balance adjustment on said record medium.
[Claim 2] Said 1st image acquisition means is the digital camera of claim 1 which is a panorama change means to extract the image of the aspect ratio of a panorama from an electronic zoom means or said 1st image pick-up area.
[Claim 3] Said information generation means is claim 1 or the digital camera of 2 characterized by generating available information to white balance adjustment of said 1st image based on the 1st image recorded on said record medium, and said 2nd image with which the same signal processing was performed.
[Claim 4] Information available to said white balance adjustment Each average of R of the whole screen of said 2nd image, G, and B signal, or the ratio of each average, R for every division area which divided the whole screen of said 2nd image into two or more area, Each average of each average of G and B signal, the ratio of each average or a luminance signal, and a color-difference signal, R of R of 1 or two or more highlighting points of the whole screen of said 2nd image, G, B signal, or a highlighting point, The greatest R in the ratio of G and B signal or the luminance signal of a highlighting point and a color-difference signal, and the whole screen of said 2nd image, Claims 1 and 2 characterized by including one of the ratio of G, B signal or the greatest R, G, and B signal, and the thumbnail images created from said 2nd image, or 3 digital cameras.
[Claim 5] Said record means is a digital camera according to claim 1 to 4 characterized by what is recorded on the image file by which said 1st image is recorded on said white balance adjustment by making available information into tag information.
[Claim 6] In the digital camera which records the image which picturizes a photographic subject using an image sensor and is acquired by this image pick-up on a record medium The 1st image acquisition means which acquires the 1st image for recording on said record medium from the 2nd image pick-up area smaller than the 1st image pick-up area of the whole image pick-up side of said image sensor, With the 2nd image acquisition means which acquires the 2nd image from image pick-up area larger than said 2nd image pick-up area, an information generation means to generate available information to scene distinction of said 1st image based on said 2nd image, and said 1st image The digital camera characterized by having a record means to relate with this 1st image and to record information available to said scene distinction on said record medium.
[Claim 7] Said 1st image acquisition means is the digital camera of claim 6 which is an electronic zoom means or a panorama change means to extract the image of the aspect ratio of a panorama from said 1st image pick-up area.
[Claim 8] Said information generation means is claim 6 or the digital camera of 7 characterized by generating available information to scene distinction of said 1st image based on the 1st image recorded on said record medium, and said 2nd image with which the same signal processing was performed.
[Claim 9] Information available to said scene distinction is claims 6 and 7 or the digital camera of 8 characterized by including one of each average of R for every division area which divided the whole screen of said 2nd image into two or more area, G, and B signal, the average of the luminance signal for every division area, the average of G signal for every division area, and the thumbnail images created from said 2nd image.
[Claim 10] Said record means is a digital camera according to claim 6 to 9 characterized by what is recorded on the

image file by which said 1st image is recorded on said scene distinction by making available information into tag information.

[Claim 11] Said 1st image recorded on said record medium with the digital camera according to claim 1 to 5, A reading means to read available information to said white balance adjustment which was related with this 1st image and recorded on said record medium, A calculation means to ask for the white balance correction value of said 1st image said information available to said read white balance adjustment or 1st image, and white balance adjustment which were read based on available information, The white balance control means which carries out white balance control of said 1st read image based on the white balance correction value calculated with said calculation means, The printer characterized by having the print means which carries out the print of said 1st image to a print form based on said 1st image by which white balance control was carried out by said white balance control means.

[Claim 12] Said 1st image recorded on said record medium with the digital camera according to claim 6 to 10, A reading means to read available information to said scene distinction which was related with this 1st image and recorded on said record medium, A scene distinction means to perform scene distinction of said 1st image to said information available to said read scene distinction or 1st image, and scene distinction which were read based on available information, The image-processing means which carries out the image processing of said 1st read image based on the scene distinction by said scene distinction means, The printer characterized by having the print means which carries out the print of said 1st image to a print form based on said 1st image by which the image processing was carried out with said image-processing means.

[Claim 13] The scene distinguished by said scene distinction means is the printer of claim 12 characterized by including one of a backlight scene, a follow light scene, and spot light scenes.

[Claim 14] Said image-processing means is claim 12 or the printer of 13 characterized by controlling at least one of the sharpness of said 1st read image, and gradation based on the scene distinction by said scene distinction means.

[Claim 15] An image pick-up means to change into an electrical signal the image data acquired optically, and a record means to record the image picturized through said image pick-up means on a record medium, An image display means to display the picturized image, and an electronic zoom means to change the image scale factor of a photographic subject by processing electronically the image data acquired through said image pick-up means, When electronic processing which relates to modification of the image scale factor of a photographic subject with the control means which performs control which records the zoom image generated with said electronic zoom means on said record medium, and said electronic zoom means is made into image data a maintenance means by which the thumbnail in the original image whole field angle can be made to hold to the image data electronically processed by said electronic zoom means -- since -- the becoming digital camera.

[Claim 16] An image pick-up means to change into an electrical signal the image data acquired optically, and a record means to record the image picturized through said image pick-up means on a record medium, The image displayed on an image display means to display the picturized image, and said image display means a part A trimming processing means to specify a field as a trimming image and to generate the image data of the trimming image of the specified field concerned, When the image data which starts a trimming image with the control means which performs control which records the trimming image generated with said trimming processing means on said record medium, and said trimming processing means is generated a maintenance means by which the thumbnail in the original image whole field angle can be made to hold to the image data generated by said trimming processing means -- since -- the becoming digital camera.

[Claim 17] An image data reception means to be the printer which carries out print processing of the image data concerning the image picturized with the digital camera, and to receive said image entry of data, An information receipt means to receive the processing information on whether electronic zoom processing of said image data is carried out with said digital camera, or trimming processing is carried out, When said information receipt means receives said processing information and said image data by which electronic zoom processing or trimming processing was carried out is printed an activation means to perform print setup processing from the thumbnail in the original image whole field angle before [by which electronic zoom processing or trimming processing is carried out] being held at said inputted image data -- since -- the becoming printer.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the printer which carries out the print of the image recorded on the digital camera which records the image which was applied to the digital camera and the printer, especially was cut down from the former image by electronic zoom photography, a panoramic exposure, trimming actuation, etc. on a record medium, and its record medium.
[0002]
[Description of the Prior Art] Conventionally, there is a digital camera in which electronic zoom photography, a panoramic exposure, and trimming actuation are possible. When the image of some area is cut down from the image of the image pick-up area of the whole image pick-up side of an image sensor when this kind of digital camera performs electronic zoom photography, and the numbers of record pixels run short with the scale factor of an electronic zoom etc., the number of pixels of the cut-down image is increased by interpolation processing, and it records on a memory card. Moreover, in performing a panoramic exposure, the image of an upside and the bottom is cut from the image of the image pick-up area of the whole image pick-up side of an image sensor, and it records the image for a center section on a memory card.
[0003] Moreover, based on the cut-down image, it is made to perform the white balance control and exposure control in the above-mentioned electronic zoom photography etc. (JP,2000-13675,A).
[0004] On the other hand, printers, such as the conventional digital printer, have many to which the autoset rise function which carries out automatic amendment of the image photoed by the nonconformity of automatic exposure (AE) control and automatic white balance (AWB) control by unsuitable brightness and white balance at the camera side at desirable image quality is attached. Moreover, automatic distinction of the descriptions (a backlight, follow light, etc.) of a scene is carried out from an input image, and the printer which carries out gradation amendment is proposed (JP,8-62741,A).
[0005] By the way, in printing electronic zoom photography and the image by which the panoramic exposure was carried out, there is a problem that light source information required for AWB control by the printer decreases. For example, considering the image which zoomed in the flower, by carrying out electronic zoom photography, it may become difficult to extract light source information and proper AWB control may not be able to be performed.
[0006] Moreover, in being the image with which an electronic zoom of the input image was carried out when automatic distinction of the scene of an input image was carried out and gradation amendment, sharpness adjustment, etc. were performed at the time of a print, there is a problem that prediction of a scene becomes difficult. For example, when there is little contrast of an input image, since an electronic zoom of the backlight scene was carried out, it cannot distinguish whether contrast has decreased and whether contrast is few images from the first.
[0007] Moreover, in the case of the image which used an electronic zoom, compared with the image in front of a zoom, the background of the image after a zoom etc. is lost in many cases. Usually, since the white and the reflection factor in a field angle are caught and processed, an automatic white balance and a automatic exposure will become the image with which the breakdown of color FERIA etc. may be caused and a proper white balance and a automatic exposure are not obtained in many cases, since the white section is lost in the field angle in many cases, if processing of an automatic white balance, a automatic exposure, etc. is performed based on the image after a zoom. Then, an automatic white balance, a automatic exposure, etc. are processed from the whole field angle of the photography image before a zoom activity, and it enables it to usually obtain a suitable image to a zoom image within image pick-up equipment at the time of photography. JP,2000-13675,A is indicating performing a automatic exposure and an automatic white balance from zoom area and the information on the circumference of it at the time of a panorama or an electronic zoom.
[0008] Moreover, when trimming an image after photography, since the automatic white balance, the automatic

exposure, etc. are processed from the whole field angle of the photography image in front of trimming from the first, within image pick-up equipment, the white balance of a trimming part and correct exposure are usually hardly spoiled.
[0009] However, when printing the image after a zoom, and the image after trimming, as for the image with which an electronic zoom and trimming were made, the setup of a printer is performed with the field angle of the image after a zoom and trimming were performed. That is, it is performing amendment of a white balance etc. from the image with which an electronic zoom and trimming were made in most cases. Therefore, there were sometimes no data, such as the white point in the large field angle of a photography image from the first, frequently in a printer wall, in the print image, color FERIA failed, or strong amendment started, and a suitable image might not be obtained.
[0010]
[Problem(s) to be Solved by the Invention] This invention is what was made in view of such a situation. Electronic zoom photography and a panoramic exposure, In case the image by which trimming actuation was carried out is recorded on a record medium, the image in front of an electronic zoom, and the image before a panorama change, Information available to the white balance adjustment obtained from the image before trimming actuation, and/or information available to scene distinction A digital camera recordable on a record medium as electronic zoom photography, a panoramic exposure, and attached information on the image by which trimming actuation was carried out, and its attached information are used. Electronic zoom photography and a panoramic exposure, It aims at offering the printer which can print the image by which trimming actuation was carried out.
[0011]
[Means for Solving the Problem] Invention which relates to this application claim 1 in order to attain said object In the digital camera which records the image which picturizes a photographic subject using an image sensor and is acquired by this image pick-up on a record medium The 1st image acquisition means which acquires the 1st image for recording on said record medium from the 2nd image pick-up area smaller than the 1st image pick-up area of the whole image pick-up side of said image sensor, The 2nd image acquisition means which acquires the 2nd image from image pick-up area larger than said 2nd image pick-up area, With an information generation means to generate available information to white balance adjustment of said 1st image based on said 2nd image, and said 1st image It is characterized by having a record means to relate with this 1st image and to record information available to said white balance adjustment on said record medium.
[0012] Said 1st image acquisition means acquires the 1st image for the center section which was a panorama change means to extract the image of the aspect ratio of a panorama from an electronic zoom means or said 1st image pick-up area as shown in this application claim 2, acquired the 1st image according to an electronic zoom by the electronic zoom means (logging), or cut an upside and the bottom by the panorama change by the panorama change means.
[0013] Although said 2nd image acquisition means acquires the 2nd image from image pick-up area larger than said 2nd image pick-up area, it acquires the image (the 2nd image) of the 1st whole image pick-up area of the whole image pick-up side of said image sensor preferably.
[0014] Said information generation means is characterized by generating available information to white balance adjustment of said 1st image based on the 1st image (the last image recorded) recorded on said record medium as shown in this application claim 3, and said 2nd image with which the same signal processing was performed.
[0015] moreover, as available information, to said white balance adjustment As shown in this application claim 4, each average of R of the whole screen of said 2nd image, G, and B signal, or the ratio of each average, R for every division area which divided the whole screen of said 2nd image into two or more area, Each average of each average of G and B signal, the ratio of each average or a luminance signal, and a color-difference signal, R of R of 1 or two or more highlighting points of the whole screen of said 2nd image, G, B signal, or a highlighting point, It is characterized by including one of the ratio of the greatest R in the ratio of G and B signal or the luminance signal of a highlighting point and a color-difference signal, and the whole screen of said 2nd image, G, B signal or the greatest R, G, and B signal, and the thumbnail images created from said 2nd image.
[0016] Said record means is characterized by what is recorded on the image file by which said 1st image is recorded on said white balance adjustment by making available information into tag information as shown in this application claim 5.
[0017] In the digital camera which records the image which invention concerning this application claim 6 picturizes a photographic subject using an image sensor, and is acquired by this image pick-up on a record medium The 1st image acquisition means which acquires the 1st image for recording on said record medium from the 2nd image pick-up area smaller than the 1st image pick-up area of the whole image pick-up side of said image sensor, With the 2nd image acquisition means which acquires the 2nd image from image pick-up area larger than said 2nd image pick-up area, an information generation means to generate available information to scene distinction of said 1st image based on said 2nd

image, and said 1st image It is characterized by having a record means to relate with this 1st image and to record information available to said scene distinction on said record medium.

[0018] Invention concerning this application claim 6 is different from scene distinction at the point which records available information on a record medium to recording information with invention available to white balance adjustment concerning this application claim 1 on the record medium. That is, based on the 2nd image obtained from image pick-up area larger than the 1st image, available information is generated to scene distinction, and information available to scene distinction is recorded on the record medium with the 1st image. By the printer which performs the image processing according to a scene by this in case the 1st image is printed, the scene of said 1st image can be distinguished good based on available information to said scene distinction.

[0019] Said 1st image acquisition means acquires the 1st image for the center section which was a panorama change means to extract the image of the aspect ratio of a panorama from an electronic zoom means or said 1st image pick-up area as shown in this application claim 7, acquired the 1st image according to an electronic zoom by the electronic zoom means (logging), or cut an upside and the bottom by the panorama change by the panorama change means.

[0020] Said information generation means is characterized by generating available information to scene distinction of said 1st image based on the 1st image recorded on said record medium as shown in this application claim 8, and said 2nd image with which the same signal processing was performed.

[0021] Information available to said scene distinction is characterized by including one of each average of R for every division area which divided the whole screen of said 2nd image into two or more area as shown in this application claim 9, G, and B signal, the average of the luminance signal for every division area, the average of G signal for every division area, and the thumbnail images created from said 2nd image.

[0022] Said record means is characterized by what is recorded on the image file by which said 1st image is recorded on said scene distinction by making available information into tag information as shown in this application claim 10.

[0023] Said 1st image by which the printer concerning this application claim 11 was recorded on said record medium with the digital camera according to claim 1 to 5, A reading means to read available information to said white balance adjustment which was related with this 1st image and recorded on said record medium, A calculation means to ask for the white balance correction value of said 1st image said information available to said read white balance adjustment or 1st image, and white balance adjustment which were read based on available information, The white balance control means which carries out white balance control of said 1st read image based on the white balance correction value calculated with said calculation means, It is characterized by having the print means which carries out the print of said 1st image to a print form based on said 1st image by which white balance control was carried out by said white balance control means.

[0024] That is, this printer reads available information with the 1st image which should be printed from a record medium to the white balance adjustment as attached information on this 1st image. Since information available to said white balance adjustment is generated based on the 2nd image (image acquired from image pick-up area larger than the 2nd image pick-up area which acquired the 1st image), said calculation means can ask said white balance adjustment for more proper white balance correction value based on available information. For example, when there is little light source information and many light source information is included in the 2nd image in the 1st image by the electronic zoom, in case a light source kind is specified and white balance correction value is calculated, it is desirable to use available information for the white balance adjustment generated from the 2nd image. in addition, the light source information in the 1st image and the light source information in the 2nd image -- abbreviation -- when the same, white balance correction value may be calculated based on the 1st image (for example, when the brightness of a highlighting point is the same), and the 1st image and white balance adjustment may be asked for white balance correction value using both available information.

[0025] Said 1st image by which the printer concerning this application claim 12 was recorded on said record medium with the digital camera according to claim 6 to 10, A reading means to read available information to said scene distinction which was related with this 1st image and recorded on said record medium, A scene distinction means to perform scene distinction of said 1st image to said information available to said read scene distinction or 1st image, and scene distinction which were read based on available information, The image-processing means which carries out the image processing of said 1st read image based on the scene distinction by said scene distinction means, It is characterized by having the print means which carries out the print of said 1st image to a print form based on said 1st image by which the image processing was carried out with said image-processing means.

[0026] The printer concerning this application claim 12 is different to the printer concerning this application claim 11 asking white balance adjustment for more proper white balance correction value based on available information in that perform scene distinction of the 1st image to scene distinction based on available information, and the image processing

of the 1st image is performed based on the distinguished scene. That is, available information is used for the scene distinction generated based on the 2nd image obtained from large image pick-up area, and the photography scene of the 1st image is distinguished from the 1st image. Although a printer performs the image processing according to a scene in case it prints the 1st image, it can perform the scene judging of said 1st image to said scene distinction good based on available information.

[0027] The scene distinguished by said scene distinction means is characterized by including one of a backlight scene, a follow light scene, and spot light scenes, as shown in this application claim 13. Moreover, said image-processing means is characterized by controlling at least one of the sharpness of said 1st read image, and gradation based on the scene distinction by said scene distinction means to be shown in this application claim 14.

[0028] An image pick-up means to change into an electrical signal the image data from which this invention of claim 15 was acquired optically, A record means to record the image picturized through said image pick-up means on a record medium, An image display means to display the picturized image, and an electronic zoom means to change the image scale factor of a photographic subject by processing electronically the image data acquired through said image pick-up means, When electronic processing which relates to modification of the image scale factor of a photographic subject with the control means which performs control which records the zoom image generated with said electronic zoom means on said record medium, and said electronic zoom means is made into image data a maintenance means by which the thumbnail in the original image whole field angle can be made to hold to the image data electronically processed by said electronic zoom means -- since -- the becoming digital camera -- since -- it becomes.

[0029] When according to this invention of claim 15 a maintenance means makes the thumbnail in the field angle of the whole former image hold to zoom image data and records the image data concerned made to hold on a record medium by the control means By transmitting to a printer the image data (zoom image data) electronically processed by said electronic zoom means in said record medium, when printing zoom image data By the printer, print setup processing can be performed from the thumbnail in the original image whole field angle before electronic zoom processing is carried out. Therefore, since data, such as the white point, are sent to a printer, the image with which a suitable white balance and exposure processing were carried out in the print image is obtained. In addition, as an approach of making the thumbnail in the field angle of the whole former image holding to zoom image data, there is also the approach of embedding the thumbnail in the field angle of the whole former image to the tag of zoom image data.

[0030] An image pick-up means to change into an electrical signal the image data from which this invention of claim 16 was acquired optically, A record means to record the image picturized through said image pick-up means on a record medium, The image displayed on an image display means to display the picturized image, and said image display means a part A trimming processing means to specify a field as a trimming image and to generate the image data of the trimming image of the specified field concerned, When the image data which starts a trimming image with the control means which performs control which records the trimming image generated with said trimming processing means on said record medium, and said trimming processing means is generated a maintenance means by which the thumbnail in the original image whole field angle can be made to hold to the image data generated by said trimming processing means -- since -- the becoming digital camera -- since -- it becomes.

[0031] According to this invention of claim 16, a maintenance means makes the thumbnail in the field angle of the whole former image hold to the image data (trimming image data) generated by the trimming processing means. By recording the image data concerned made to hold on a record medium by the control means When printing trimming image data, by the printer, print setup processing can be performed from the thumbnail in the original image whole field angle before trimming processing is carried out by transmitting the trimming image data in said record medium to a printer. Therefore, since data, such as the white point, are sent to a printer, the image with which a suitable white balance and exposure processing were carried out in the print image is obtained. In addition, as an approach of making the thumbnail in the field angle of the whole former image holding to trimming image data, there is also the approach of embedding the thumbnail in the field angle of the whole former image to the tag of trimming image data. Moreover, the image data generated by the trimming processing means also contains the image data which carried out trimming processing as a result of carrying out a zoom of the image after photography.

[0032] An image data reception means for this invention of claim 17 to be a printer which carries out print processing of the image data concerning the image picturized with the digital camera, and to receive said image entry of data, An information receipt means to receive the processing information on whether electronic zoom processing of said image data is carried out with said digital camera, or trimming processing is carried out, When said information receipt means receives said processing information and said image data by which electronic zoom processing or trimming processing was carried out is printed an activation means to perform print setup processing from the thumbnail in the original image whole field angle before [by which electronic zoom processing or trimming processing is carried out] being held

at said inputted image data -- since -- the becoming printer -- since -- it becomes. According to this invention of claim 17, an image data reception means receives the image entry of data applied to the image picturized with the digital camera in a printer. Said image data the processing information on whether electronic zoom processing of the information receipt means is carried out with said digital camera, and/or whether trimming processing is carried out Reception, When said information receipt means receives said processing information, an activation means To namely, the case of whether electronic zoom processing of said image data is carried out with said digital camera, and/or whether trimming processing is carried out In case said image data by which electronic zoom processing and/or trimming processing were carried out is printed, print setup processing is performed from the thumbnail in the original image whole field angle before [by which electronic zoom processing and/or trimming processing are carried out] being held at said inputted image data. Therefore, since data, such as the white point, reach to a printer, the image with which a suitable white balance and exposure processing were carried out in the print image is obtained.

[0033]

[Embodiment of the Invention] It explains in full detail about the gestalt of desirable operation of the digital camera applied to this invention according to an accompanying drawing below, and a printer.

[0034] Drawing 1 is the block diagram showing the gestalt of operation of the digital camera 100 concerning this invention.

[0035] In this drawing, the photographic subject image by which image formation was carried out to the light-receiving side of a solid state image pickup device (CCD) 114 through a taking lens 110 and drawing 112 is changed into the signal charge of the amount according to the amount of incident light of light by each sensor. Thus, reading appearance of the accumulated signal charge is carried out to a shift register by the lead gate pulse added from the CCD actuation circuit 116, and reading appearance is carried out one by one by the register transfer pulse as a voltage signal according to a signal charge. In addition, this CCD114 can sweep out the accumulated signal charge by the shutter gate pulse, and has the so-called electronic shutter ability which controls the storage time (shutter speed) of a charge by this.

[0036] The voltage signal by which reading appearance was carried out one by one from CCD114 is applied to the correlation duplex sampling circuit (CDS circuit) 118, and the sampling hold of R for every pixel, G, and the B signal is carried out, and it is applied to A/D converter 120 here. A/D converter 120 changes and outputs R and G which are added one by one, and B signal from the CDS circuit 118 to digital R, G, and B signal. In addition, the CCD actuation circuit 116, the CDS circuit 118, and A/D converter 120 synchronize with the timing signal added from the timing generating circuit 122, and are driven.

[0037] R and G which were outputted from said A/D converter 120, and B signal are once stored in memory 124, and R and G which were stored in memory 124, and B signal are added to the digital-signal-processing circuit 126 after that. The digital-signal-processing circuit 126 consists of the synchronization circuit 128, the white balance equalization circuit 130, a gamma correction circuit 132, a YC signal creation circuit 134, and memory 136 grade.

[0038] The synchronization circuit 128 changes into a simultaneous type point sequential R by which reading appearance was carried out, G, and B signal from memory 124, and outputs R, G, and B signal to the white balance equalization circuit 130 simultaneously. The white balance equalization circuit 130 consists of multipliers 130R, 130G, and 130B for fluctuating the digital value of R, G, and B signal, respectively, and R, G, and B signal are added to Multipliers 130R, 130G, and 130B, respectively. a multiplier -- 130 -- R -- 130 -- G -- 130 -- B -- others -- an input -- **** -- a central processing unit (CPU) -- 138 -- from -- a white balance -- control -- carrying out -- a sake -- a white balance -- correction value (gain value) -- adding -- having -- **** -- a multiplier -- 130 -- R -- 130 -- G -- 130 -- B -- respectively -- two -- inputs -- multiplication -- carrying out -- this -- multiplication -- a white balance -- adjustment -- carrying out -- having had -- R -- ' -- G -- ' -- B -- ' -- a signal -- the gamma correction circuit 132 -- outputting . In addition, about the detail of the white balance correction value applied to the white balance equalization circuit 130 from CPU138, it mentions later.

[0039] a gamma correction -- a circuit -- 132 -- a white balance -- adjustment -- carrying out -- having had -- R -- ' -- G -- ' -- B -- ' -- a signal -- a request -- gamma -- a property -- becoming -- as -- input-output behavioral characteristics -- changing -- YC signal creation circuit 134 -- outputting . YC signal creation circuit 134 creates a luminance signal Y and the chroma signals Cr and Cb from R and G by which the gamma correction was carried out, and B signal. These luminance signal Y and chroma signals Cr and Cb (YC signal) are stored in the memory 136 of the same room as memory 124. In addition, the profile intensifier (not shown) is established in the latter part of YC signal creation circuit 134, and this profile intensifier generates the profile amendment signal for emphasizing the profile of an image based on the luminance signal Y to input in this digital-signal-processing circuit 126, and performs profile emphasis of a luminance signal Y in it by adding that profile amendment signal to a luminance signal Y.

[0040] Reading appearance of the YC signal stored in said memory 136 is carried out serially, and it is outputted to a

liquid crystal display monitor 152. Thereby, a through image, the photoed still picture can be displayed on a liquid crystal display monitor 152.

[0041] Moreover, after YC signal after photography is compressed into a predetermined format by compression/expanding circuit 154, it is recorded on record media, such as a memory card, at the Records Department 156. Furthermore, after expanding processing of the image data currently recorded on the memory card etc. is carried out by compression/expanding circuit 154 at the time of a playback mode, it is outputted to a liquid crystal display monitor 152, and a playback image is displayed on a liquid crystal display monitor 152.

[0042] CPU138 controls auto-focusing (AF), automatic exposure (AE), an automatic white balance (AWB), an electronic zoom, etc. while carrying out generalization control of each circuit based on the input from the camera control unit 140 (a shutter carbon button, a mode dial, a cross-joint key, etc. are included). This AF control is the contrast AF to which a taking lens 110 is moved so that the high frequency component of for example, G signal may become max, and it moves a taking lens 110 to a focus location through an actuator 142 so that the high frequency component of G signal may become max at the time of the half-push of a shutter carbon button.

[0043] Moreover, AE control incorporates R, G, and B signal, asks for photographic subject brightness (photography exposure value) based on the integrated value which integrated such R and G, and B signal, and determines the drawing value and shutter speed at the time of photography based on this photography exposure value. And after controlling the storage time of a charge by the electronic shutter, incorporating the image data for one coma so that it may become said determined shutter speed which extracted extracting and becoming a value, extracted through the actuator 144, and drove and determined 112 at the time of all push of a shutter carbon button, and carrying out necessary signal processing, it records on a record medium.

[0044] Next, the AWB amendment approach is explained.

[0045] The average integrated value according to color of R, G, and B signal is calculated for each [which divides one screen into two or more area (8x8, 16x16 grade)] division area of every from R and G by which the temporary storage was carried out to memory 124, and B signal. The average integrated value of R for every division area of such, G, and B signal is computed by the counting circuit 148, and is applied to CPU138. Between the counting circuit 148 and CPU138, Multipliers 150R, 150G, and 150B are formed, and the adjustment gain value for adjusting the variation in a device is applied to Multipliers 150R, 150G, and 150B.

[0046] CPU138 is based on the average integrated value of R for every above-mentioned division area, G, and B signal, and is daylight (fine) and the shade. - It blooms cloudy and light source kinds, such as a fluorescent lamp and a tungsten filament lamp, are distinguished. this light source kind of distinction -- said every division area -- the ratio of the average integrated value according to color of R, G, and B signal -- the detection frame in which the range of the color distribution corresponding to each light source kind is shown on the graph which R/G and B/G are calculated, and continues, makes an axis of abscissa R/G and makes an axis of ordinate B/G is set up. and said ratio for every area for which it asked -- it asks for the number of area which goes into said detection frame based on R/G and B/G, and a light source kind is distinguished based on the number of area included in the intensity level and detection frame of a photographic subject (refer to JP,2000-224608,A) . In addition, the method of searching for a light source kind (color temperature of a field) automatically based on R and G which were obtained from CCD114, and B signal is not limited to the gestalt of this operation.

[0047] If a light source kind (color temperature of a field) is searched for as mentioned above, CPU138 will determine the white balance correction value suitable for the light source kind, and will output the determined white balance correction value (gain value) to Multipliers 130R, 130G, and 130B. thereby -- a multiplier -- 130 -- R -- 130 -- G -- 130 -- B -- from -- a white balance -- adjustment -- carrying out -- having had -- R -- ' -- G -- ' -- B -- ' -- a signal -- a gamma correction -- a circuit -- 132 -- outputting -- having .

[0048] In addition, with the gestalt of this operation, although it is made to perform white balance processing in the digital-signal-processing circuit 126, it may be made to carry out in the analog signal processing circuit containing the CDS circuit 118, the gain control amplifier which is not illustrated. moreover, white balance processing -- R, G, and B -- although respectively independent gain processing is performing by changing the ratio of R/G and B/G -- a color-difference signal Cr and Cb respectively independent addition-and-subtraction processing -- a color-difference signal Cr and Cb There is also the approach of performing by making the existing value add or subtract. Moreover, when emitting light in stroboscope light from a strobe lighting system 146, the white balance correction value for performing a good white balance to stroboscope light is applied to the white balance equalization circuit 130.

[0049] Next, electronic zoom control is explained.

[0050] R and G by which reading appearance was carried out from the image pick-up area of the whole image pick-up side of CCD114, and B signal are once stored in memory 124. The electronic zoom section 125 from all the image pick-

up area stored in memory 124 R of area according to the zoom command inputted from CPU138 based on zoom actuation of the camera control unit 140 (the cross-joint key top carbon button assigned as a zoom carbon button, and bottom carbon button), G and B signal are started and a different storage area from the storage area with which the number of pixels is made to increase and R of the former image of memory 124, G, and B signal are remembered to be by remaining as it is or the interpolation operation is made to memorize this started R, G, and B signal.

[0051] The image size of all the image pick-up area of CCD114 in addition, by for example, 2400x1800 pixels When an electronic zoom scale factor is made into 1.5 times and the image size to record is 1600x1200 pixels R of the logging range by the electronic zoom, G, and B signal are recorded as it is. The number of pixels is decreased by interpolation and infanticide as the image size which is made to increase the number of pixels with interpolation, and is recorded becomes smaller than 1600x1200 pixels as the image size to record becomes larger than 1600x1200 pixels. moreover, when an electronic zoom scale factor is made into 1.875 times and the image size to record is 1280x960 pixels R of the logging range by the electronic zoom, G, and B signal are recorded as it is. The number of pixels is decreased by interpolation and infanticide as the image size which is made to increase the number of pixels with interpolation, and is recorded becomes smaller than 1280x960 pixels as the image size to record becomes larger than 1280x960 pixels. That is, the number of pixels made to fluctuate by interpolation processing in the electronic zoom section 125 etc. is determined by the image size of CCD114, the image size to record, and the electronic zoom scale factor.

[0052] Drawing 2 is image drawing showing signs that an image is expanded by the electronic zoom, and as shown in drawing 2 (A), while the image (R, G, B signal) of all the image pick-up area of CCD114 is stored, the image (R, G, B signal) of some area of all the image pick-up area of CCD114 by which an electronic zoom was carried out as shown in drawing 2 (B) is stored in memory 124.

[0053] Moreover, when an electronic zoom is carried out, AE control mentioned above is performed based on the image (R, G, B signal) of logging within the limits by the electronic zoom, and AWB amendment is performed based on the image (R, G, B signal) of all image pick-up area. After necessary signal processing is carried out through the digital-signal-processing circuit 126, this image (R, G, B signal) by which an electronic zoom was carried out is compressed into a predetermined format by compression/expanding circuit 154, and is recorded on a record medium.

[0054] Next, it explains in full detail about the attached information (tag information) on the image (the main image) recorded on a record medium.

[0055] As shown in drawing 3 , when the image of the zoom area A2 is cut down and recorded with an electronic zoom from all the image pick-up area A1 and the information on the highlights part B (information which can be judged to be the color of the light source) is in the outside of the zoom area A2, the information on the highlights part B will be omitted and recorded. In this case, in case the image by which an electronic zoom was carried out is printed, information required for AWB control by the printer decreases.

[0056] Moreover, in being the image with which an electronic zoom of the input image was carried out when automatic distinction of the scene of an input image was carried out and gradation amendment, profile emphasis, etc. were performed at the time of a print, compared with the image in front of an electronic zoom, prediction of a scene becomes difficult. For example, when an electronic zoom of the backlight scene is carried out, distinction of being a backlight scene becomes difficult.

[0057] So, in recording the image which carried out an electronic zoom on a record medium, he is trying to record information available to the white balance adjustment obtained from the image in front of an electronic zoom (image of all the image pick-up area A1) as tag information on the image, and information available to scene distinction in this invention.

[0058] That is, the image (R, G, B signal) of all the image pick-up area A1 stored in memory 124 as shown in drawing 1 is outputted to digital-signal-processing circuit 126'. this -- digital signal processing -- a circuit -- 126 -- ' -- synchronization -- a circuit -- 128 -- ' -- a white balance -- an equalization circuit -- 130 -- ' -- a gamma correction -- a circuit -- 132 -- ' -- YC -- a signal -- creation -- a circuit -- 134 -- ' -- and -- a counting circuit -- 135 -- ' -- from -- constituting -- having -- **** . in addition -- synchronization -- a circuit -- 128 -- ' -- a white balance -- an equalization circuit -- 130 -- ' -- a gamma correction -- a circuit -- 132 -- ' -- and -- YC -- a signal -- creation -- a circuit -- 134 -- ' -- digital signal processing -- a circuit -- 126 -- synchronization -- a circuit -- 128 -- a white balance -- an equalization circuit -- 130 -- a gamma correction -- a circuit -- 132 -- and -- YC -- a signal -- creation -- a circuit -- 134 -- being the same -- processing -- carrying out -- a sake -- explanation detailed here -- omitting . Moreover, YC signal outputted from YC signal creation circuit 134of digital-signal-processing circuit 126" and YC signal outputted from YC signal creation circuit 134 of the digital-signal-processing circuit 126 are signals of the same kind, and only area differs.

[0059] Counting-circuit 135' calculates the addition average according to each signal of a luminance signal Y, the chroma signal Cr, and the chroma signal Cb for each [which divides all the image pick-up area A1 into two or more

area (16x16) as shown in drawing 3] division area of every.
[0060] The Records Department 156 will record the luminance signal Y which carried out the addition average for every division area of all the image pick-up area A1 computed by said counting-circuit 135', the chroma signal Cr, and the chroma signal Cb as tag information, if the information which shows things done for an electronic zoom, such as a zoom command, from CPU138 is inputted.
[0061] Although the luminance signal Y which carried out the addition average for every division area of all the image pick-up area A1, the chroma signal Cr, and the chroma signal Cb were recorded on tag information as information (henceforth "AWB information") available to white balance adjustment, you may make it record on tag information by making the following information into AWB information here.
[0062] (1) R in all the image pick-up area A1, G, each average Rav of B signal, Gav and Bav (2) Ratio Rav/Gav each above-mentioned averages Rav, Gav, and Bav Bav/Gav (3) R of every division area (i=1-256, or 1-64) Ai of all the image pick-up area A1, Each average Ravi, Gavi, and Bavi of G and B signal (4) Each above-mentioned average Ravi Gavi and Bavi a ratio -- Ravi/Gavi and Bavi/Gavi (5) It Rp(s). The highlighting point (1 pixel or 3 pixels of a high order) in all the image pick-up area A1 Gp, Bp (6) Rp of the above-mentioned highlighting point, Gp, and Bp Ratio Rp / Gp, Bp/Gp (7) The luminance signal Y, the chroma signal Cr of the above-mentioned highlighting point, Cb (8) the greatest Rp' in all the image pick-up area A1, and Gp -- ' -- The Bp 'ratio Rp of Rp' of the (9) above-mentioned max, Gp', and Bp" / Gp', Bp'/Gp' (10) Although the luminance signal Y which carried out the addition average for every division area of all the image pick-up area A1 was recorded on the thumbnail image which thinned out and created the image of all the image pick-up area A1, and scene distinction as available information (henceforth "AE information") You may make it record the following information as AE information.
[0063] (1) R of every division area (i=1-256, or 1-64) Ai of all the image pick-up area A1, each average Ravi, Gavi, and Bavi of G and B signal (2) Division area Ai of all the image pick-up area A1 every -- the average Gavi of G signal (3) With the thumbnail image which thinned out and created the image of all the image pick-up area A1, in addition the gestalt of this operation In the digital-signal-processing circuit 126, although digital-signal-processing circuit 126' of another system was prepared, in case the above-mentioned AWB information and AE information are computed, time-sharing utilization of said digital-signal-processing circuit 126 may be carried out.
[0064] Drawing 4 shows the example of structure of the image file recorded on a record medium.
[0065] As shown in this drawing, the header unit various kinds of information attached to an image is indicated to be, and the main image section on which the picturized main image is recorded are prepared in the image file. Although photography time information, the AWB information mentioned above, and AE information are recorded on a header unit Furthermore, electronic zoom information (the existence of an activity of an electronic zoom, electronic zoom scale factor, etc.), stroboscope information (the return information which shows the existence of a stroboscope activity, and the existence of stroboscope attainment --) The color temperature, the photographic subject distance information, the continuous-shooting information, the user setting-out information (WB, exposure amendment, etc.), the lens property information (the distortion of a taking lens 110, chromatic aberration of magnification, shading, etc.), and the thumbnail image of stroboscope light are recorded. In addition, although the thumbnail image of the gestalt of this operation is created from the image in front of an electronic zoom, you may make it record simultaneously what was further created from the image after an electronic zoom.
[0066] The above-mentioned electronic zoom information, AWB information, AE information, stroboscope information, photographic subject distance information, continuous-shooting information, user setting-out information, lens property information, and a thumbnail image are applicable to the amendment processing at the time of a print.
[0067] That is, electronic zoom information is used for the image processing of the sharpness of the image to print, and it performs the image processing which raises sharpness, so that an electronic zoom scale factor is large. About the detail of the utilization at the time of the print of AWB information and AE information, it mentions later. Stroboscope information performs WB amendment with the white balance correction value acquired from the input image etc., when WB amendment which was suitable for the color temperature (it is the color temperature when the color temperature of stroboscope light is controllable by LED of R, G, and B) of the stroboscope light when it was used for WB amendment of the image to print and there was a stroboscope return is performed and there is no stroboscope return. Photographic subject distance information is used for the sharpness of an image and the image processing of contrast to print, and performs the image processing from which a long distance raises sharpness and contrast.
[0068] Continuous-shooting information is used in order to perform the image processing after the 2nd sheet by the same setting out as the image of the 1st sheet. Thereby, while being able to raise a print rate, the continuity of each image improves. User setting-out information is used in order to make an intention of a user reflect in a print. Lens property information is used in order to amend the distortion of a taking lens 110, the chromatic aberration of

magnification, shading, etc. by the printer side. Furthermore, the thumbnail image with a bigger field angle than the main image is used in order to extract AWB information and AE information from the larger range.
[0069] Next, trimming control is explained.
[0070] Drawing 7 is the flow chart which showed a trimming control flow. A user chooses the trimming menu of a digital camera 100 (step 300). And the image (the main image) currently recorded on the Records Department 156 is read, and the image by which reading appearance was carried out is carried out in expanding processing in compression/expanding section 154, and is once stored in memory 124. a user -- the cross-joint key of the camera control unit 140 -- operating it -- trimming actuation -- carrying out (step 302) -- The trimming section 400 starts R of area according to the trimming command inputted from CPU138, G, and B signal from all the image pick-up area stored in memory 124. This started R, G, and B signal as it is Or a different storage area from the storage area with which the number of pixels is made to increase and R of the former image of memory 124, G, and B signal are remembered to be by the interpolation operation is made to memorize.
[0071] Therefore, while the image (R, G, B signal) of all the image pick-up area of CCD114 is stored in memory 124, the image (R, G, B signal) of some area of all the image pick-up area of CCD114 by which trimming was carried out is stored. After necessary signal processing is carried out through the digital-signal-processing circuit 126, the image (R, G, B signal) by which trimming was carried out is compressed into a predetermined format by compression/expanding circuit 154, and is recorded on a record medium.
[0072] Trimming information is recorded on the attached information (tag information) on the image (the main image) recorded on a record medium (step 304).
[0073] It explains using drawing 3 . Let A2 be trimming area among drawing 3 .
[0074] When the image of the trimming area A2 is cut down and recorded with trimming from all the image pick-up area A1 and the information on the highlights part B (information which can be judged to be the color of the light source) is in the outside of the trimming area A2, the information on the highlights part B will be omitted and recorded. In this case, in case the image by which trimming was carried out is printed, information required for AWB control by the printer decreases.
[0075] In being the image with which trimming of the input image was carried out when automatic distinction of the scene of an input image was carried out and gradation amendment, profile emphasis, etc. were performed at the time of a print, compared with the image in front of trimming, prediction of a scene becomes difficult. For example, when a backlight scene is trimmed, distinction of being a backlight scene becomes difficult.
[0076] So, in recording the trimmed image on a record medium, he is trying to record information available to the white balance adjustment obtained from the image in front of trimming (image of all the image pick-up area A1) as tag information on the image, and information available to scene distinction in this invention.
[0077] Since it is the same as that of the case where the above-mentioned image which carried out an electronic zoom is recorded on a record medium, the procedure which records the trimmed image on a record medium from information available to the white balance adjustment which can be obtained from the image in front of trimming, and information available to scene distinction is skipped here.
[0078] The Records Department 156 will record the luminance signal Y which carried out the addition average for every division area of all the image pick-up area A1 computed by counting-circuit 135', the chroma signal Cr, and the chroma signal Cb as tag information, if the information which shows things done for trimming, such as a trimming command, from CPU138 is inputted.
[0079] Although the luminance signal Y which carried out the addition average for every division area of all the image pick-up area A1, the chroma signal Cr, and the chroma signal Cb were recorded on tag information as information (henceforth "AWB information") available to white balance adjustment, you may make it record on tag information here by making into AWB information the thumbnail image which thinned out and created the image of all the image pick-up area A1.
[0080] Moreover, although the luminance signal Y which carried out the addition average for every division area of all the image pick-up area A1 was recorded on scene distinction as available information (henceforth "AE information"), you may make it record the thumbnail image which thinned out and created the image of all the image pick-up area A1 as AE information.
[0081] Drawing 9 shows the example of structure of the image file recorded on the record medium at the time of trimming.
[0082] As shown in this drawing, the header unit various kinds of information attached to an image is indicated to be, and the main image section on which the picturized main image is recorded are prepared in the image file. Although photography time information, the AWB information mentioned above, and AE information are recorded on a header

unit Furthermore, trimming information (location of the existence of an activity of trimming, a flag, and the trimmed pixel etc.), stroboscope information (the return information which shows the existence of a stroboscope activity, and the existence of stroboscope attainment --) The color temperature, the photographic subject distance information, the continuous-shooting information, the user setting-out information (WB, exposure amendment, etc.), the lens property information (the distortion of a taking lens 110, chromatic aberration of magnification, shading, etc.), and the thumbnail image of stroboscope light are recorded. In addition, although the thumbnail image of the gestalt of this operation is created from the image in front of trimming, you may make it record simultaneously what was further created from the image after trimming.

[0083] The above-mentioned trimming information, AWB information, AE information, stroboscope information, photographic subject distance information, continuous-shooting information, user setting-out information, lens property information, and a thumbnail image are applicable to the amendment processing at the time of a print. Since it is the same as that of the case of the above-mentioned electronic zoom for details, explanation is omitted. The thumbnail image with a bigger field angle than the main image is used in order to extract AWB information and AE information from the larger range.

[0084] In addition, when trimming actuation is performed, an electronic zoom may also already have been performed. Electronic zoom information is also seen whether recorded on the tag after step 304 of drawing 7 (step 306).

[0085] Here, after an electronic zoom is carried out, the writing of tag information when trimming actuation is carried out is explained. Drawing 10 shows the example of structure of the image file recorded on a record medium when trimming actuation is carried out, after an electronic zoom is carried out. Although image file structure when an electronic zoom is carried out is as being shown in drawing 4 , when trimming is carried out after this, as shown in drawing 10 , the thumbnail of the image by which trimming information (location of the existence of an activity of trimming, a flag, and the trimmed pixel etc.) was added, and trimming was carried out is also added. Although the thumbnail of the image by which trimming was carried out may be created from the main image, you may generate from the thumbnail of all image pick-up area, and the latter of processing is quicker. An electronic zoom of the main image was carried out, and it carried out trimming.

[0086] In addition, you may make it also put the thumbnail of the main image into tag information with the thumbnail of all image pick-up area in drawing 4 and the image file structure of drawing 9 . In this case, in the above-mentioned step 306, when electronic zoom information is in tag information, the thumbnail (step 318) of all image pick-up area, a zoom and the thumbnail (step 322) of the trimmed image, a zoom, and the trimmed main image (step 326) are generated, respectively, and is respectively saved in memory 124 (steps 320, 324, and 328).

[0087] In step 306, when there is no electronic zoom information in tag information, the thumbnail (step 308) of all image pick-up area and the trimmed image (step 312) are generated, respectively, it is saved in memory 124 (step 314), and the main image which the thumbnail of all image pick-up area was saved in memory 124 (step 310), and trimmed it, and the thumbnail of the trimmed main image are saved in memory 124 (step 316). In addition, the thumbnail of the trimmed image may be generated from the thumbnail of all image pick-up area.

[0088] Drawing 5 is the block diagram showing the gestalt of operation of the printer concerning this invention.

[0089] As shown in this drawing, this printer 200 is a digital printer and mainly consists of the image thawing processing section 210, the tag information read station 220, a frame memory 230, the parameter decision section 240, the automatic image amendment processing section 250, a chrominance-signal converter 260, and a print engine 270.

[0090] It has the card slot in which the external record media 102, such as SmartMedia which this printer 200 is connected with the digital camera 100 mentioned above through the direct connection interface 101, and can be crowded direct picking in the image file which the digital camera 100 generated, and is used in the digital camera 100, are inserted, and an image file (drawing 4 , 9, 10 reference) can be incorporated now from the external record medium 102 inserted in this card slot.

[0091] After the external record medium 102 is inserted in this printer 200 or a digital camera 100 is connected, when the coma which should be printed is specified, the image thawing processing section 210 of a printer 200 incorporates image data from the image file of the coma by which print assignment was carried out, thaws the image data compressed, generates YC signal, and makes a frame memory 230 memorize this YC signal.

[0092] The tag information read station 220 reads tag information from the above-mentioned image file, and outputs this to the parameter decision section 240.

[0093] The parameter decision section 240 determines the parameter (autoset rise parameter) of the automatic image amendment processing used in the automatic image amendment processing section 250, sets the parameter as the automatic image amendment processing section 250, and, in the case of an electronic zoom or the image by which trimming is not carried out, determines it for every input image printed based on YC signal incorporated to the frame

memory 230.

[0094] Moreover, the parameter decision section 240 determines as a parameter based on YC signal which the input image which it is going to print based on the tag information inputted from the tag information read station 220 distinguished whether they were an electronic zoom and/or the trimmed image, and determined the parameter based on the AWB information in tag information, and AE information in the case of an electronic zoom and/or the trimmed image, or was incorporated to AWB information, AE information, and a frame memory 230. In addition, an electronic zoom in the parameter decision section 240 and/or distinction of being an image by which trimming was carried out can be performed based on the electronic zoom information (the existence of an electronic zoom activity is included) and/or trimming information (the existence of a trimming activity is included) in tag information.

[0095] How to calculate an electronic zoom and/or the white balance correction value of an image by which trimming was carried out by this parameter decision section 240 is explained.

[0096] Rp of a highlighting point [in / in the AWB information in now and tag information / all the image pick-up area A1 of CCD114], Gp, and Bp When it carries out (refer to drawing 3), the luminance signal YMAX1 of this highlighting point is searched for. Moreover, based on YC signal incorporated to the frame memory 230, the luminance signal YMAX2 of the highlighting point in an electronic zoom and/or the image by which trimming was carried out is searched for. And when a luminance signal YMAX1 is larger than a luminance signal YMAX2, AWB information (Rp, Gp, and Bp) judges it as the color of the light source, and calculates the white balance correction value suitable for the color of the light source. The color of the light source is distinguished based on YC signal which the luminance signal YMAX1 and the luminance signal YMAX2 were in abbreviation etc. by carrying out, and was incorporated to the case on the other hand at the frame memory 230, and the white balance correction value suitable for the color of the light source is calculated. In addition, you may make it calculate an electronic zoom and/or the white balance correction value of an image by which trimming was carried out only based on the AWB information in tag information. Moreover, how to calculate white balance correction value is not limited to this.

[0097] Next, how to ask for an electronic zoom and/or other parameters (gradation correction value, sharpness correction value) of the image by which trimming was carried out by the parameter decision section 240 is explained.

[0098] first, each division area [in / in AE information in tag information / all the image pick-up area A1 of CCD114] Ai every -- luminance signal Yi Luminance signal Yavi which carried out the addition average ** -- if it carries out -- this luminance signal Yavi A scene is distinguished based on the distribution in a screen. For example, even when whether the screen upside is empty cannot distinguish from an electronic zoom and/or the trimmed image, based on the image in front of an electronic zoom and/or trimming (dimension image), it can distinguish that an electronic zoom and/or the trimmed image upside are empty.

[0099] In case the parameter decision section 240 asks for the brightness of an input image with the complicated algorithm according to a scene based on the luminance signal Y of the input image from a frame memory 230, it can ask for the brightness of an input image with the algorithm suitable for the scene by distinguishing a scene (for example, scene that a screen upside is empty), as mentioned above. For example, in an empty part and other parts, weighting to a luminance signal can be changed and it can ask for brightness. And the gradation correction value for printing an electronic zoom and/or the trimmed image with proper brightness from the brightness for which carried out in this way and it asked can be calculated.

[0100] Moreover, luminance signal Yavi A backlight scene, a follow light scene, a spot light scene, etc. can be distinguished from the distribution in a screen. In addition, since a field angle becomes small as for the image by which an electronic zoom was carried out, distinction of being a backlight scene becomes difficult.

[0101] By carrying out scene distinction as mentioned above, when there is little contrast of for example, an input image, it can distinguish whether an electronic zoom and/or since it trimmed, contrast has decreased the backlight scene, and whether contrast is few images from the first. And since the flare and a ghost may be contained when contrast has decreased the backlight scene, an electronic zoom and/or since it trimmed, processing which amends contrast and sharpness is not performed or it weakens. On the contrary, from the first, when contrast is few images, amendment processing of contrast or sharpness is strengthened.

[0102] The parameters (white balance correction value, gradation correction value, sharpness correction value, etc.) determined by the parameter decision section 240 are set up, the automatic image amendment processing section 250 of a printer 200 performs amendment processing based on the parameter by which setting out was carried out [above-mentioned] in YC signal stored in the frame memory 230, and a color, gradation, sharpness, etc. are adjusted so that it may be suitable for a print.

[0103] Drawing 6 is the block diagram showing the internal configuration of the above-mentioned automatic image amendment processing section 250. This automatic image amendment processing section 250 consists of an AWB

amendment circuit 252, a gradation amendment circuit 254, and a profile intensifier 256.
[0104] White balance correction value (gain value for carrying out multiplication to each color-difference signals Cr and Cb) is applied to the AWB amendment circuit 252 from the parameter decision section 240 mentioned above while YC signal was added from the frame memory 230, and the AWB amendment circuits 252 are color-difference signals Cr and Cb. The multiplication of the white balance correction value is carried out. YC signal by which white balance amendment was carried out in the AWB amendment circuit 252 is added to the gradation amendment circuit 254.
[0105] The gradation correction value corresponding to the brightness of the input image determined by the parameter decision section 240 mentioned above is applied to other inputs of the gradation amendment circuit 254. The gradation amendment circuit 254 has two or more gradation amendment look-up tables (LUT) according to the magnitude of for example, gradation correction value, and chooses the proper gradation amendment LUT with the gradation correction value inputted from the parameter decision section 240. And gradation amendment of the luminance signal Y inputted from the AWB amendment circuit 252 using this selected gradation amendment LUT is carried out.
[0106] While the luminance signal Y by which gradation amendment was carried out in said gradation amendment circuit 254 is added, sharpness correction value (for example, gain value) is applied to the profile intensifier 256 from the parameter decision section 240 mentioned above. The profile intensifier 256 generates the profile amendment signal for emphasizing the profile of an image based on the luminance signal Y to input, and carries out the multiplication of said sharpness correction value to the profile amendment signal. Thus, by adding the profile amendment signal with which the magnitude (degree of profile emphasis) of a profile amendment signal was amended to a luminance signal Y, profile emphasis of this luminance signal Y is performed.
[0107] The luminance signal Y amended by the automatic image amendment processing section 250 in drawing 5 and a color-difference signal Cr, and Cb After being added to the chrominance-signal converter 260 and changed into R, G, and B signal here, it is changed into Y, M, and C (yellow, Magenta, cyanogen) signal, or is directly changed into Y, M, and C signal, and is sent out to the sequential print engine 270.
[0108] The print engine 270 is what adopted TA (thermostat auto chromium) method as for example, a print method, the color photographic paper (henceforth "TA paper") itself which has each coloring layer of C, M, and Y colors it with heat, is established by the exposure of the light of predetermined wavelength, and has the means and thermal head which convey TA paper, the fixation lamp, etc. In printing a color picture, first, while conveying TA paper, control a thermal head by the Y signal, and the yellow layer of TA paper is made to color, and it fixes coloring of yellow with a fixation lamp continuously. Coloring of the Magenta layer of TA paper and a cyanogen layer is similarly performed based on M signal and C signal, is carried out in this way, and a color picture is printed on a print form. In addition, although the printer of the gestalt of this operation is a TA printer, it can apply not only this but this invention also to the printer of other formats, such as an ink jet method.
[0109] On the other hand, the input image which it is going to print based on the tag information inputted from the tag information read station 220 distinguishes whether they are an electronic zoom and/or the trimmed image, and, in the case of an electronic zoom and/or the trimmed image, the parameter decision section 240 also has a method of reading the thumbnail of all the image pick-up area in tag information. In this case, the thumbnail image of all image pick-up area is analyzed, and parameters (white balance correction value, gradation correction value, sharpness correction value, etc.) are determined based on the AWB information on this thumbnail image, and AE information. In addition, an electronic zoom in the parameter decision section 240 and/or distinction of being an image by which trimming was carried out can be performed based on the electronic zoom information (the existence of an electronic zoom activity is included) and/or trimming information (the existence of a trimming activity is included) in tag information.
[0110] Such flow of a series of is shown in drawing 8 .
[0111] First, there is a demand of image printing (step 330). That is, after the external record medium 102 is inserted in a printer 200 or a digital camera 100 is connected, the coma which should be printed is specified and the activation command of a print is issued. Then, the image thawing processing section 210 of a printer 200 incorporates image data from the image file of the coma by which print assignment was carried out, thaws the image data compressed, generates YC signal, and makes a frame memory 230 memorize this YC signal.
[0112] The tag information read station 220 reads tag information from an image file, and outputs this to the parameter decision section 240. When tag information is read, it judges whether there is any electronic zoom information (step 332). When there is electronic zoom information, the thumbnail of all image pick-up area is called (step 338). When there is no electronic zoom information, it judges whether there is any trimming information (step 334). When there is trimming information, the thumbnail of all image pick-up area is called too (step 338). At step 334, when there is no trimming information, the thumbnail for a display is called (step 336).
[0113] Also in step 338, also in step 336, white balance correction value, gradation correction value, sharpness

correction value, etc. are computed by printer autoset rise next (step 340).
[0114] And also when reading the thumbnail of all these image pick-up area, the automatic image amendment processing section 250 of a printer 200 performs amendment processing based on the parameters (white balance correction value, gradation correction value, sharpness correction value, etc.) determined by the parameter decision section 240 in YC signal stored in the frame memory 230 (calculation), and a color, gradation, sharpness, etc. are adjusted so that it may be suitable for a print (step 342).
[0115] The processing actuation after the automatic image amendment processing section 250 is the same as that of the above-mentioned example in processing actuation in the automatic image amendment processing section 250, and a list. Therefore, the print engine 270 starts eventually and it is printed (step 344). According to the approach of reading the thumbnail of all these image pick-up area, since a printer 200 does not need to analyze the AWB information in a tag, and AE information, it can simplify actuation.
[0116] Although AWB information and AE information were searched for with the gestalt of this operation from the former image (image of all the image pick-up area of an image sensor) with which the same signal processing as an electronic zoom and/or the trimmed image was performed, you may make it search for AWB information and AE information from the former image for example, not only this but before a gamma correction.
[0117] Moreover, although AWB information and AE information are searched for from a former image, such information is related with an electronic zoom and/or the trimmed image and it was made to record when recording an electronic zoom and/or the trimmed image In case the image which cut the predetermined range of a former image [not only this but] upside and the bottom and which carried out the panoramic exposure is recorded, AWB information and AE information are searched for from a former image, it relates with the image which carried out the panoramic exposure of such information, and you may make it record.
[0118] Furthermore, with the gestalt of this operation, although AWB information and AE information were searched for from the image of all image pick-up area, when searching for AWB information and AE information from the image of all image pick-up area, it does not necessarily restrict that what is necessary is just to search for AWB information and AE information from the image of area larger than the area of an electronic zoom and/or the trimmed image, or the image by which the panoramic exposure was carried out.
[0119]
[Effect of the Invention] As explained above, in case electronic zoom photography and the image by which the panoramic exposure was carried out are recorded on a record medium according to this invention Since available information was acquired from the image in front of an electronic zoom, or the former image before a panorama change (image of area larger than the image with which an electronic zoom etc. was carried out at least) to white balance adjustment, Much information can be acquired rather than available information to the white balance adjustment obtained only from the image with which an electronic zoom etc. was carried out. And since available information was recorded on the white balance adjustment which carried out in this way and was acquired as attached information on electronic zoom photography or the image by which the panoramic exposure was carried out, said attached information can be used at the time of electronic zoom photography or the print of an image by which the panoramic exposure was carried out, and more proper white balance adjustment can be performed at it.
[0120] Since similarly available information was acquired from the former image to scene distinction when recording electronic zoom photography and the image by which the panoramic exposure was carried out on a record medium, much information can be acquired rather than available information to the scene distinction obtained only from the image with which an electronic zoom etc. was carried out. And since available information was recorded on the scene distinction which carried out in this way and was acquired as attached information on electronic zoom photography or the image by which the panoramic exposure was carried out, said attached information can be used at the time of electronic zoom photography or the print of an image by which the panoramic exposure was carried out, more proper scene distinction can be performed, and gradation amendment, sharpness amendment, etc. according to the scene can be performed.
[0121] Since according to this invention of claim 15 print setup processing is performed from the thumbnail in the original image whole field angle and data, such as the white point, are sent to a printer in case zoom image data is printed by the printer, the suitable image with which a suitable white balance and exposure processing were carried out in the print image is obtained.
[0122] Since according to this invention of claim 16 print setup processing is performed from the thumbnail in the original image whole field angle and data, such as the white point, are sent to a printer in case trimming image data is printed by the printer, the suitable image with which a suitable white balance and exposure processing were carried out in the print image is obtained.

[0123] Since according to this invention of claim 17 print setup processing is performed from the thumbnail in the original image whole field angle and data, such as the white point, reach to a printer in case zoom image data and trimming image data are printed, the suitable image with which a suitable white balance and exposure processing were carried out in the print image is obtained.

[Translation done.]

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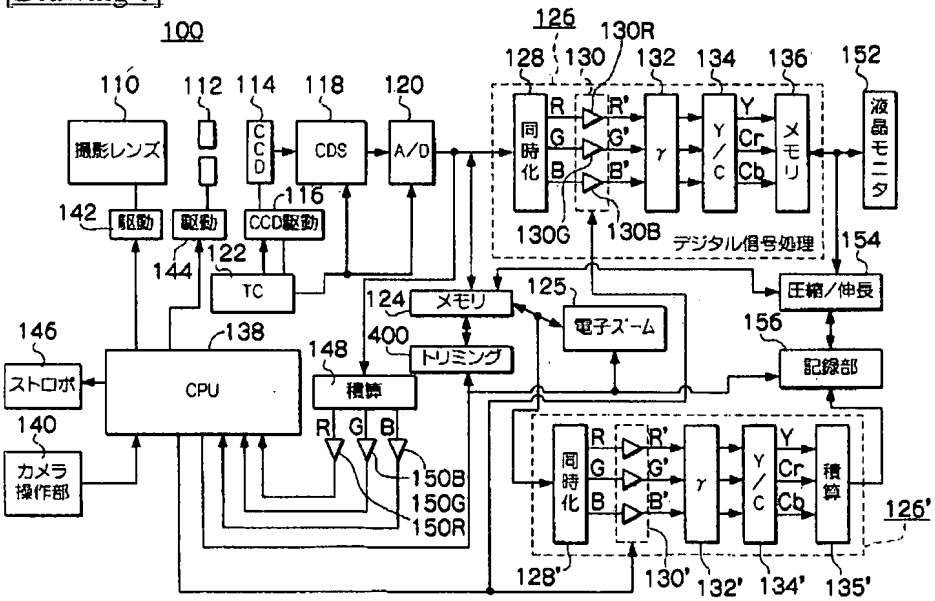
damages caused by the use of this translation.

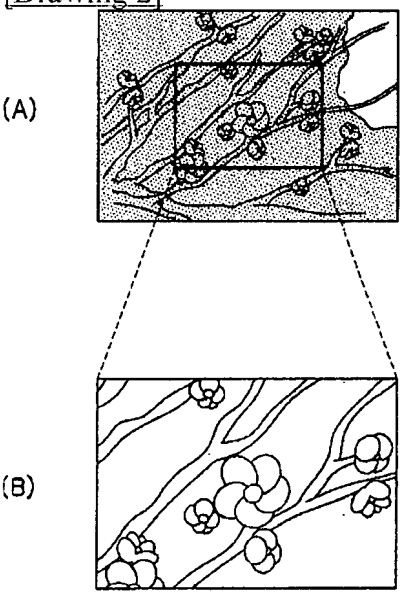
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

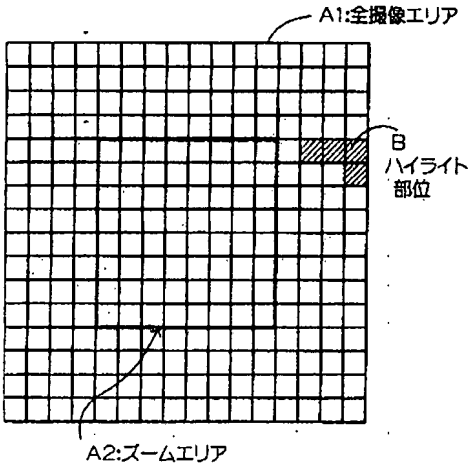
[Drawing 1]



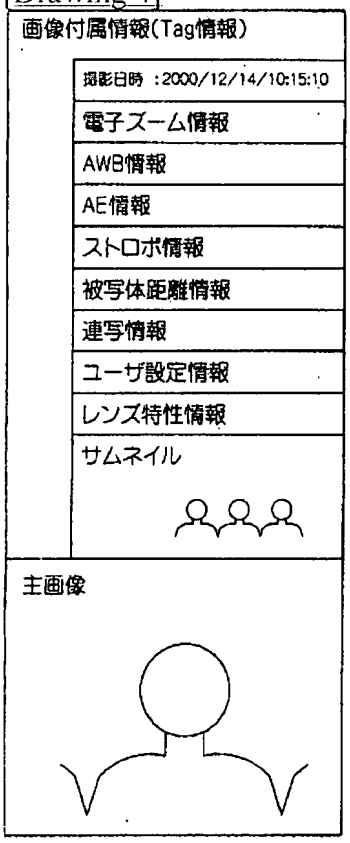
[Drawing 2]



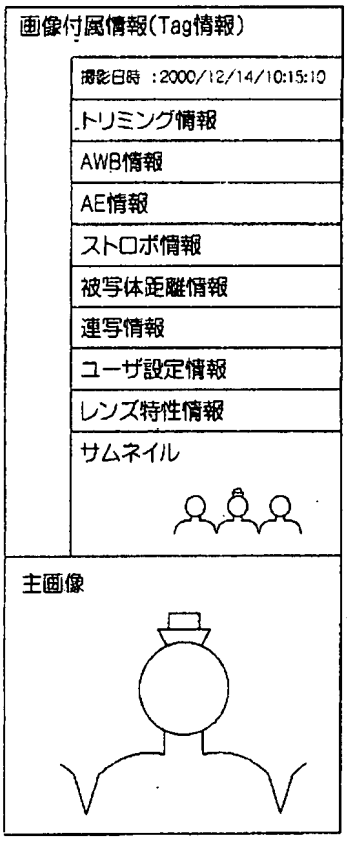
[Drawing 3]



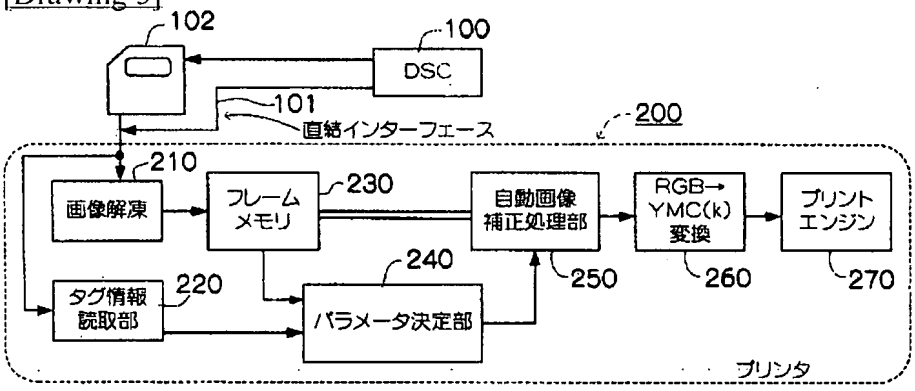
[Drawing 4]



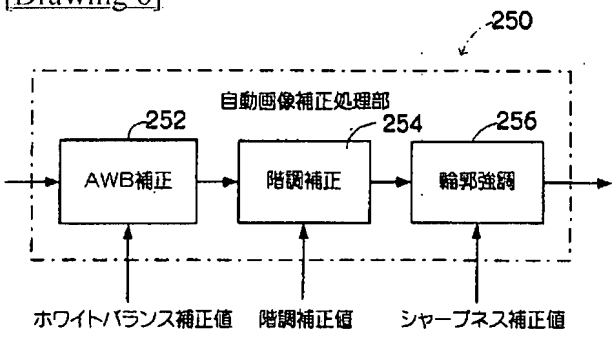
[Drawing 9]



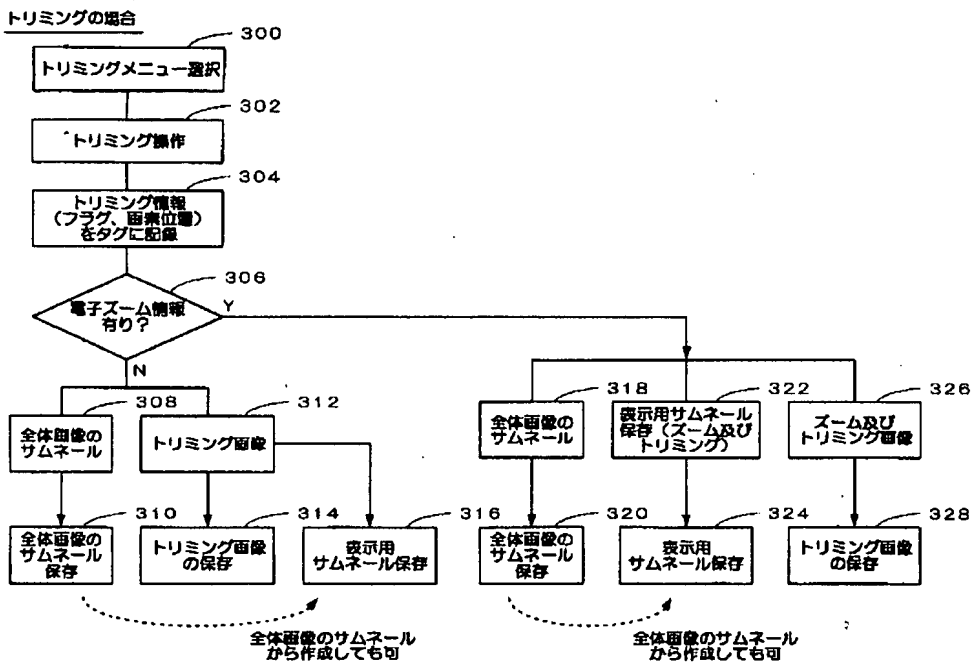
[Drawing 5]



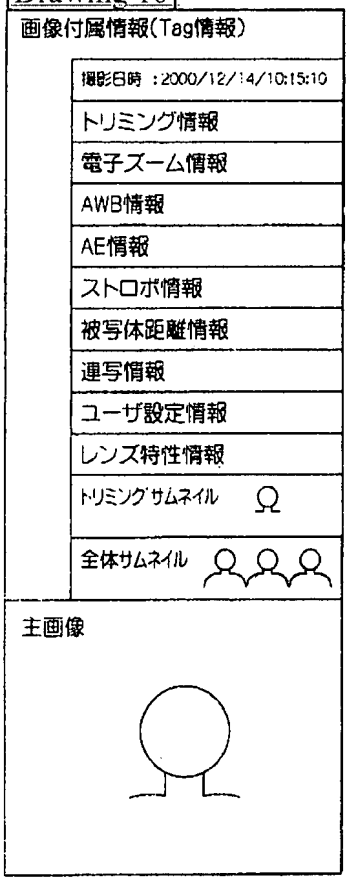
[Drawing 6]



[Drawing 7]

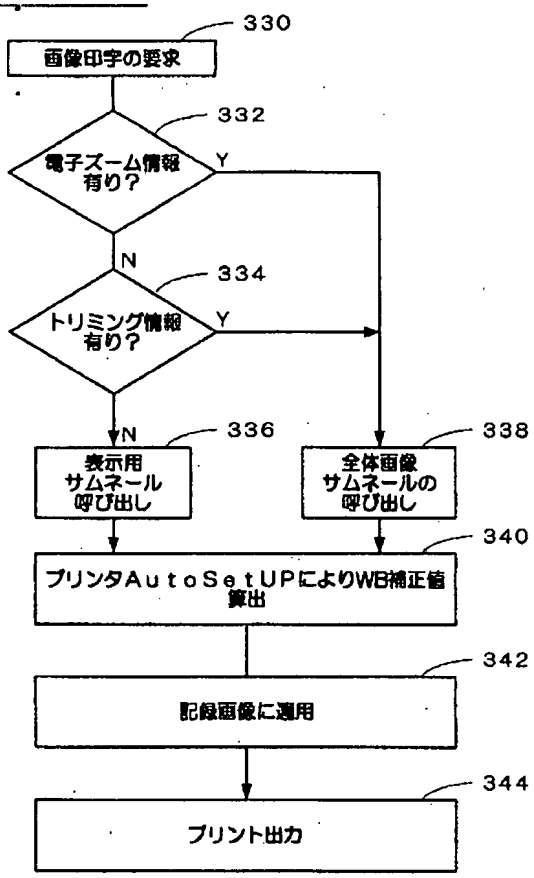


[Drawing 10]



[Drawing 8]

プリンタ側のフロー



[Translation done.]